

REMARKS

The present filing is responsive to the Office Action.

Summary of the Response

The specification has been amended to correct an obvious typographical error in paragraph [0030].

Claims 6 and 7 have been amended. Claims 1-20 remain pending in this application.

Reexamination and reconsideration of the present application as amended are respectfully requested.

Claim Rejections Under 35 USC § 112

Claim 7 has been rejected under 35 U.S.C. § 112, second paragraph, as failing to provide sufficient antecedent basis for "the first width" and "the second width". In response, Applicants amended claim 7 to provide antecedent basis for the recited terms.

Claim Rejections Under 35 USC § 103

Claims 1-2, 6-12 and 15-20 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Rottmayer et al (US 2003/0198146) in view of Jeong et al (US 2002/0039469). Claims 3-5 and 13-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Rottmayer et al (US 2003/0198146) in view of Jeong et al (US 2002/0039469).

as applied to claims 1-2, 6-12 and 15-20 above, and further in view of Dawes et al (US 6,744,951). These rejections are respectfully traversed.

On the outset, Applicants note that at least Rottmayer and Dawes were published less than one year prior to the effective filing date of the present application. As such, Applicants may be entitled to "swear behind" these references. However, given the traversal of the rejections below, Applicants have not yet considered such option, but reserve the right to do so should the need arise.

a. Rottmayer in view of Jeong

The Examiner acknowledged that Rottmayer fails to disclose energy coupling of first and second waveguides in a data recording head as required by independent claims 1, 12 and 18.

The Examiner looked to Jeong for such teaching. Applicants respectfully submit that there is no teaching, suggestion, and motivation, or any apparent reason to one of ordinary skill in the art to combine the teachings of Rottmayer and Jeong, for at least the reasons discussed below.

Contrary to the Examiner's assertion in the Office Action, Jeong is not in the same field of endeavor as Rottmayer. Rottmayer relates to the field of heat assisted magnetic recording heads (see, Rottmayer at [0002]). Jeong however relates to a spot size converter for coupling an optical fiber and integrated devices (see, Jeong at [0001]). Jeong is therefore from a very different technical field than the HAMR field of Rottmayer and the data recording head field of the present invention. Jeong is thus non-analogous art to Rottmayer, or to the present invention. One of ordinary skill in the art would not have looked to Jeong for teaching of energy-coupling two waveguides in a data recording head, and specifically a data recording head of the present invention.

Further, there is no apparent reason and the references do not contain any suggestion (express or implied) that they be combined in the first place, much less they be combined in the manner suggested only by the Examiner (which can only be made possible with the benefit of hindsight reconstruction given the disclosure of the present invention). The present invention is directed to the coupling of an input waveguide to an output waveguide in a heat assisted magnetic recording head. The present invention presented an enabling disclosure of a specific embodiment, in which the input waveguide has a characteristic width or thickness larger than that of the output waveguide. Referring to [0029] and [0030] of the specification of the present invention, "width" should be construed in reference to the view shown in Figs. 3 and 4. That is, "width" should be referenced in the direction from the first waveguide to the second waveguide, as shown in Figs. 3 and 4, which corresponds to the thickness of the respective waveguides. The relative widths of the waveguides allows for more efficient end fire coupling of the input waveguide to an input radiant energy (e.g., delivered by an optical fiber), while providing a smaller output spot size that is required for the data recording head. (This aspect of the invention is more specifically recited in claims 6, 7, 14 and 19.) Jeong does not contain any disclosure of a viable solution to overcome the shortcomings of prior art single waveguide HAMR designs. In fact, Jeong discloses a two-waveguide structure that appears to be counter-productive to overcoming such shortcomings. Referring to Jeong at [0021], the thickness of the input waveguide ($d_{in} = 0.15 \mu\text{m}$) is less than that of the output waveguide ($d_{out} = 0.4 \mu\text{m}$). The dimensions of w_{in} and w_{out} in Jeong do not refer to the "width" of the waveguide, in the context of the disclosure of the present invention. Further, the sectional area of the input waveguide ($w_{in} \times d_{in} = 3.0 \mu\text{m} \times 0.15 \mu\text{m} = 0.45 \mu\text{m}^2$) is smaller than that of the output waveguide ($w_{out} \times d_{out} = 1.2 \mu\text{m} \times 0.4 \mu\text{m} = 0.48 \mu\text{m}^2$). Therefore, Jeong actually teaches away from the combination

proposed by the Examiner. In any attempt to achieve the present invention, it would be necessary to make modifications, not taught or rendered obvious by the prior art, in order to combine the references in the manner suggested only by the Examiner.

Applicants note that Rottmayer is complete and functional in itself, so there would be no reason, and in fact no reason has been stated in Rottmayer, to use parts from or add or substitute parts from any other references. Rottmayer does not contain any expressed or implied suggestion that its HAMR head design can and should be modified to include energy coupling of two waveguides. Rottmayer does not address the shortcomings of using a single waveguide in prior art heat assisted magnetic recording (HAMR) heads. As noted at [0007] in the specification of the present application, in some instances, a waveguide configuration with a size that is suitable for HAMR head is not suitable for efficient coupling of light from a laser. Some HAMR head designs require that the slider, which supports the head, have a sufficiently large back surface area in order to accommodate coupling of the light from the laser, which competes for space with the bonding pads of the slider. These and other drawbacks of having single waveguide in prior art HAMR head structures are recognized by the Applicants, who created a novel HAMR head design that allows for efficient coupling of radiant energy into a waveguide, which does not require large surface area of the slider, and which does not substantially compete with the bonding pads for the back surface area of the slider. Accordingly, one skill in the art would not have looked to Jeong to find the solutions that could overcome the drawbacks of the prior art, which solutions are found only by the inventors of the present invention.

Further, even if combined, Rottmayer and Jeong would not meet the claims, for example claims 6, 7, 14 and 19. Claims 6, 7, 14 and 19 require the first waveguide (i.e., the input waveguide) to have a larger input spot size or larger width compared to the second waveguide.

As noted earlier, Rottmayer does not disclose energy coupling two waveguides. Jeong does not make up for the deficiencies of Rottmayer. Jeong discloses W_{in} to be larger than W_{out} . However W_{in} does not correspond to the input spot size or the width (or thickness) of the waveguide in the context of the claims of the present invention. It is noted that nowhere in Jeong states that W_{in} is a measure of the input spot size.

b. Rottmayer in view of Jeong and Dawes

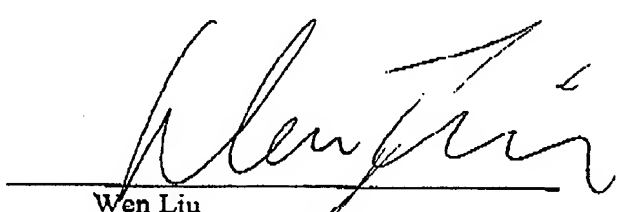
Dawes does not make up for the deficiencies of Rottmayer and Jeong noted above. The mere disclosure of end fire coupling in Dawes is insufficient to provide the missing teachings and suggestions in Rottmayer and Jeong. There is also no disclosure or suggestion in Rottmayer, Jeong and Dawes that end fire coupling can and should be applied to the input waveguide in Rottmayer. Accordingly, Rottmayer, Jeong and Dawes do not render claims 3-5 and 13-14 obvious.

CONCLUSION

In view of all the foregoing, Applicant submits that the claims pending in this application are patentable over the references of record and are in condition for allowance. Such action at an early date is earnestly solicited. **The Examiner is invited to call the undersigned representative to discuss any outstanding issues that may not have been adequately addressed in this response.**

Respectfully submitted,

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